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B62K 21/06

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B7E ESJ

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GB 2111002 A GB 0852828 A EP 0093379 A2
US 5246297 A US 5246296 A US 4445703 A

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(54) Abstract Title
Steering head set for a bicycle

(57) The bicycle steering head set comprises an upper cup kit 1 with a cap 12 having axial open slots 1212, and a lower cup kit 2 with a plugging adaptor ring 22 having axial open slots 222. In each cup kit, balls 112,212 are held in place between a rim flange 1114,2114 of a bearing collar 111,211 and a cone ring 113,213 by a retainer ring 114,214 which forms a bearing cup unit (11,21, fig 1) in which grease may be sealed. In use, the two bearing cup units (11,21) are plugged into the ends of a steering tube 3, and sandwiched between the cap 12 and adaptor ring 22. Taper faces 1211,(221) on the cap 12 and adaptor ring 22 are tightened against inner cone surfaces 1132,(2132) of cone rings 113,213 with the resultant compression of slots 1212,222 allowing the cap 12 and adaptor ring 22 to clamp tightly onto a shaft tube 4 of the bicycle front forks.

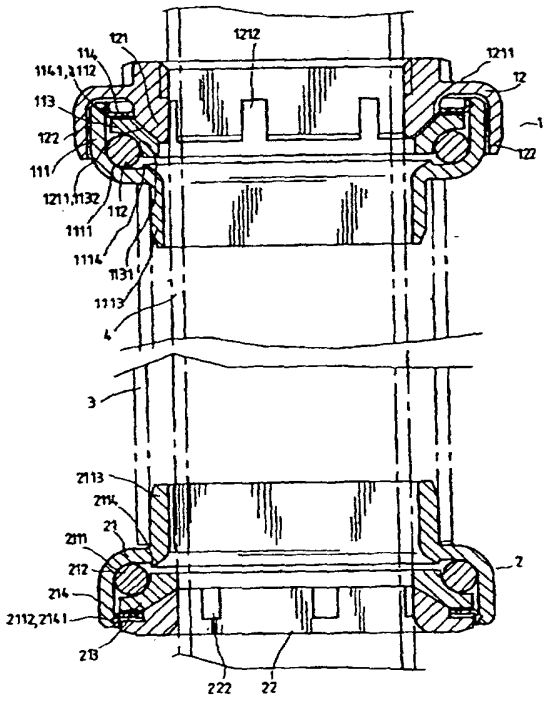

FIG.3

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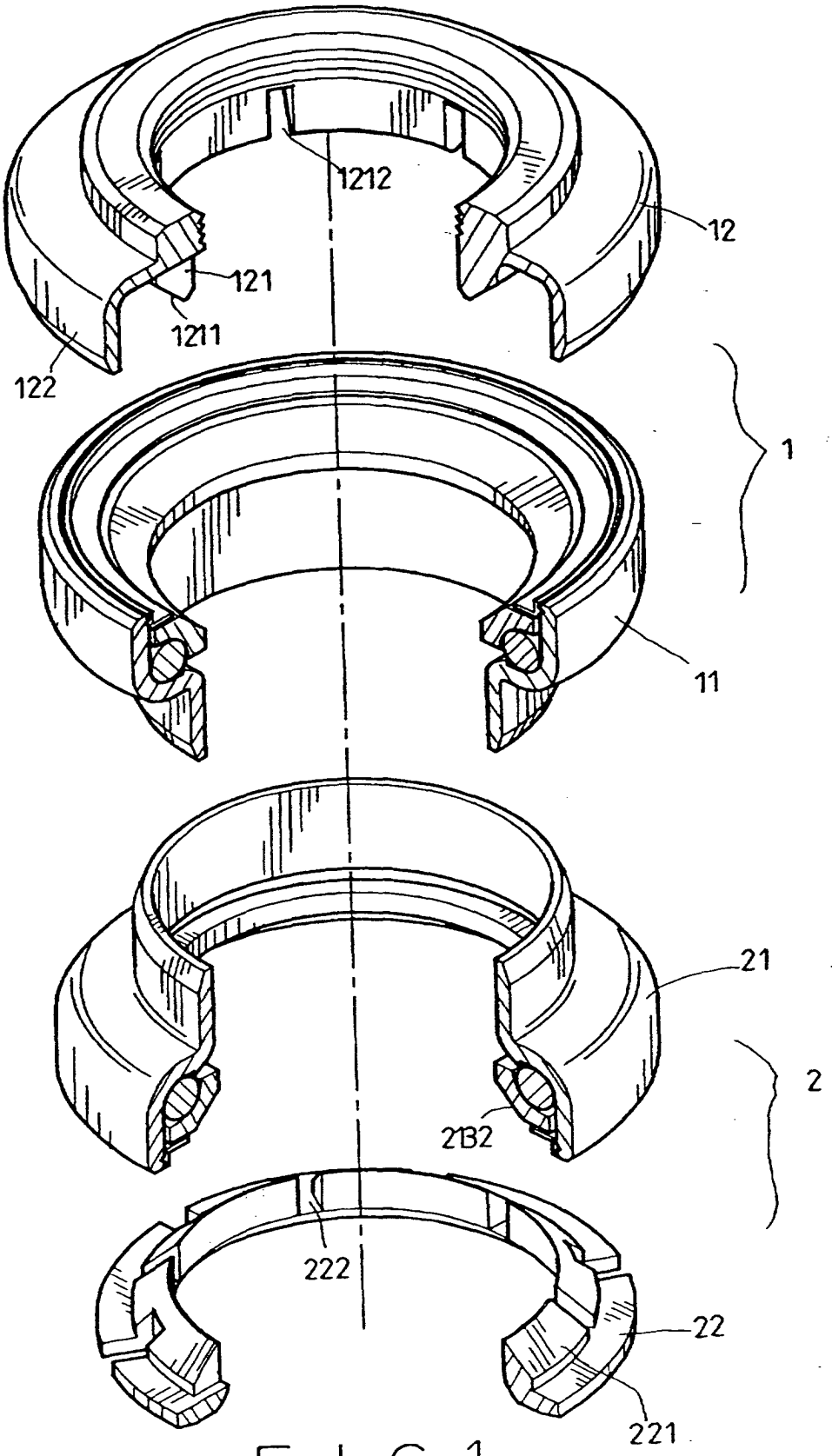

FIG.1

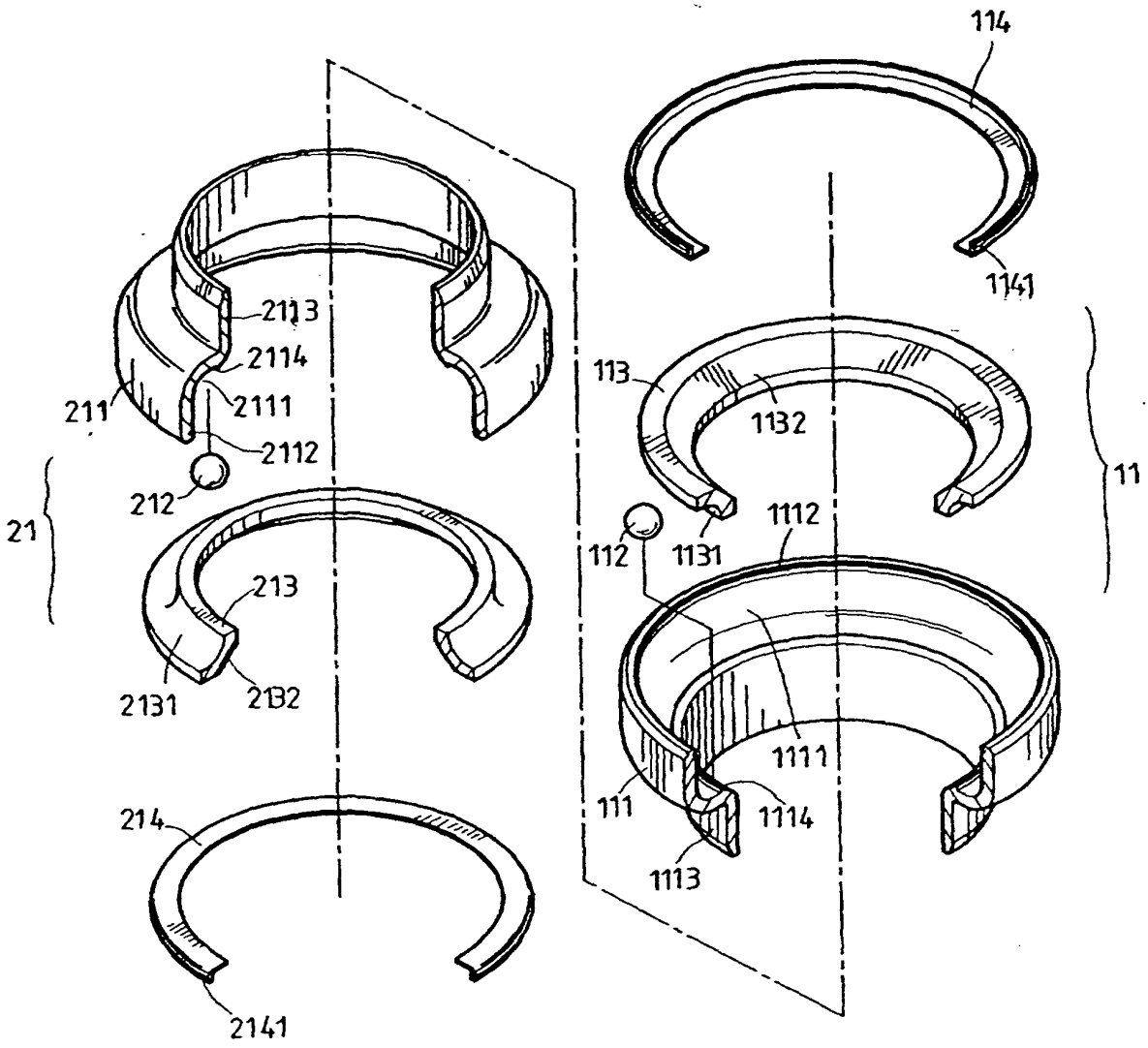

FIG. 2

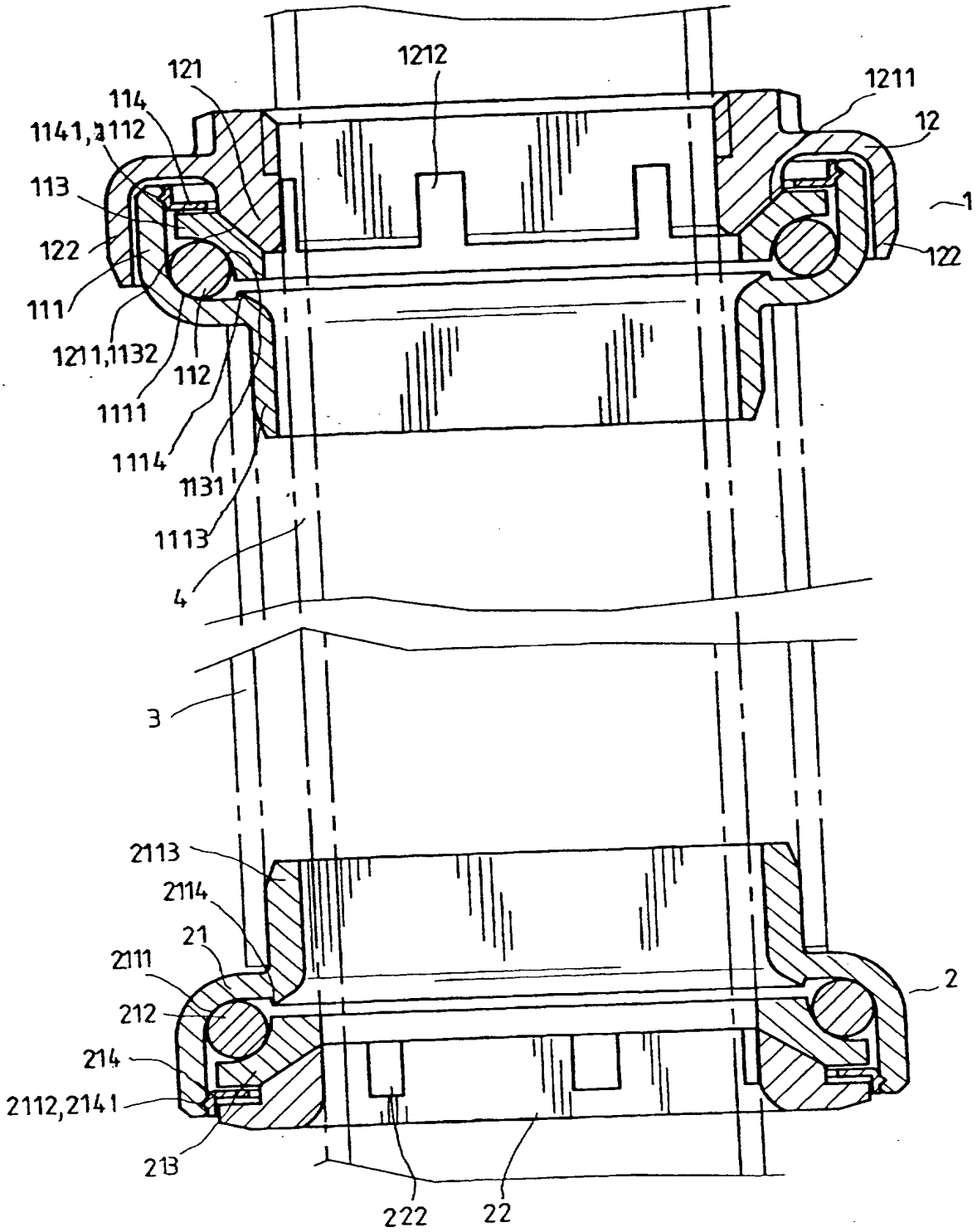

FIG. 3

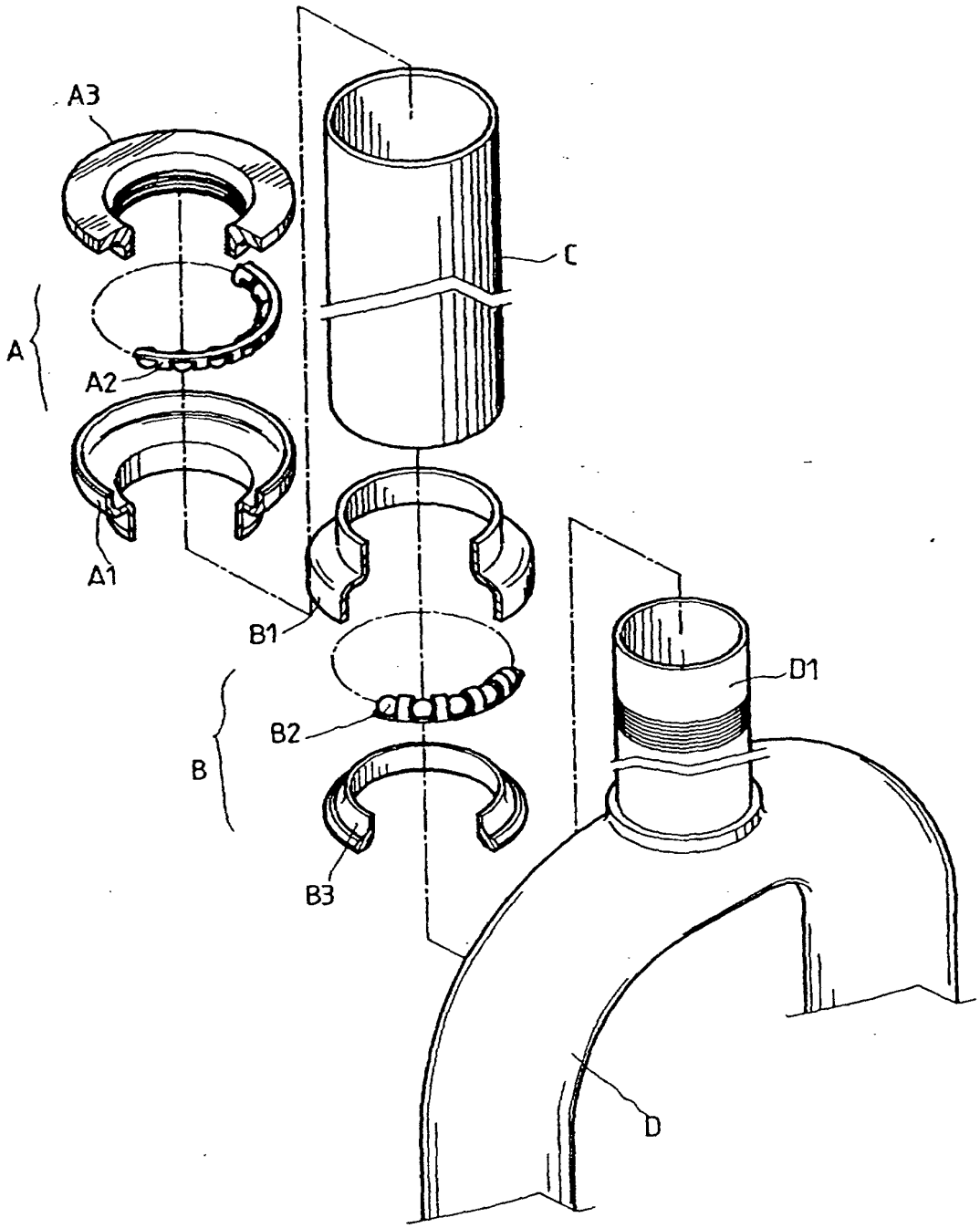

FIG. 4
(PRIOR ART)

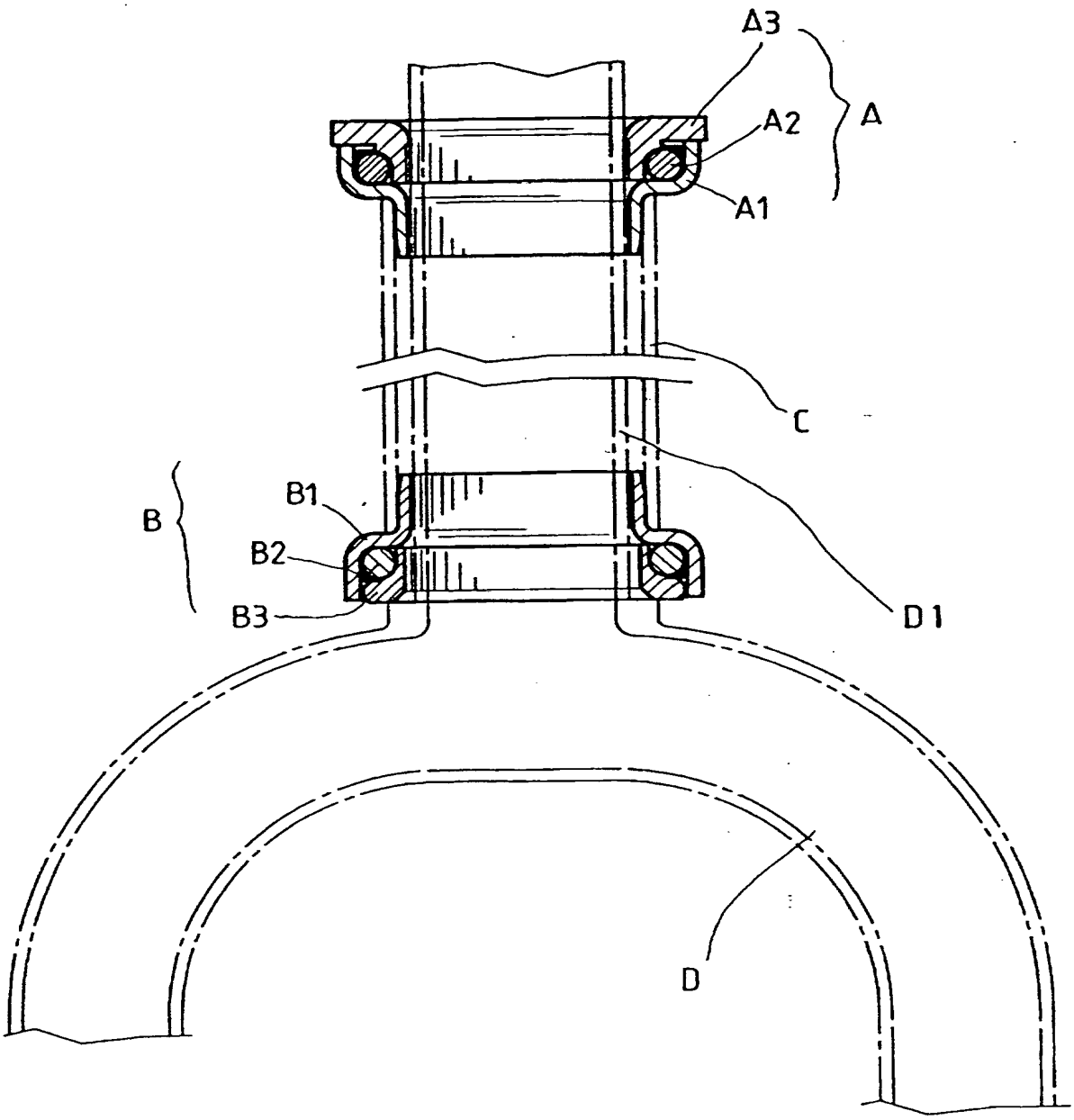

FIG. 5
(PRIOR ART)

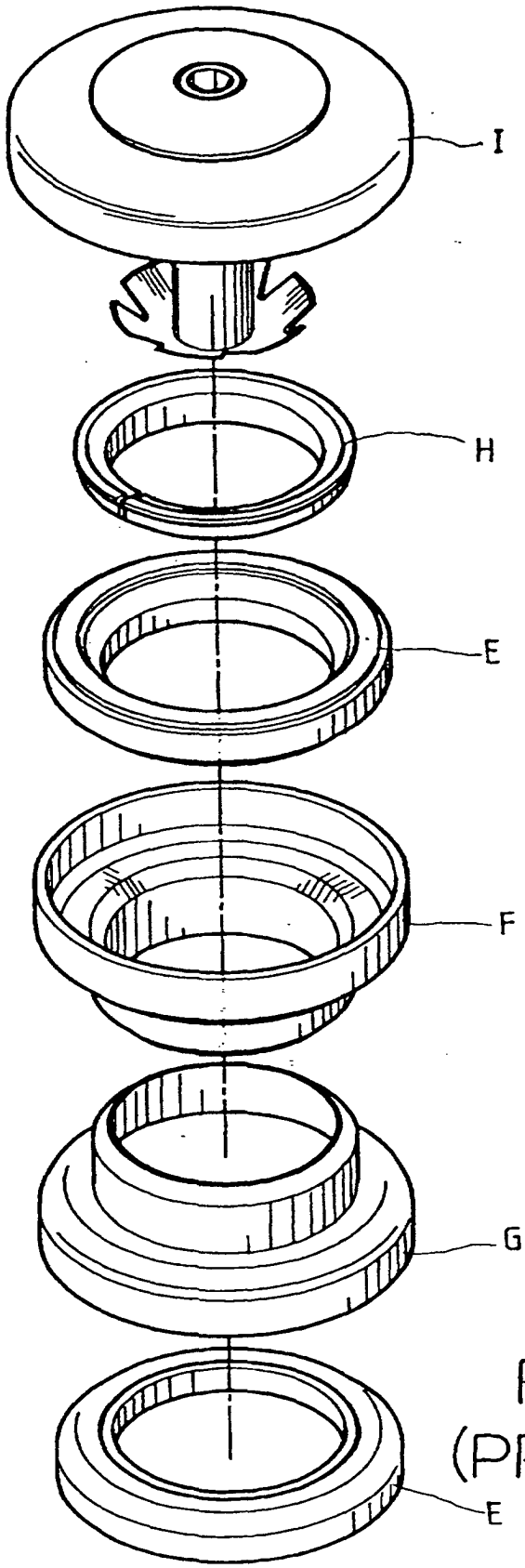

FIG.6
(PRIOR ART)

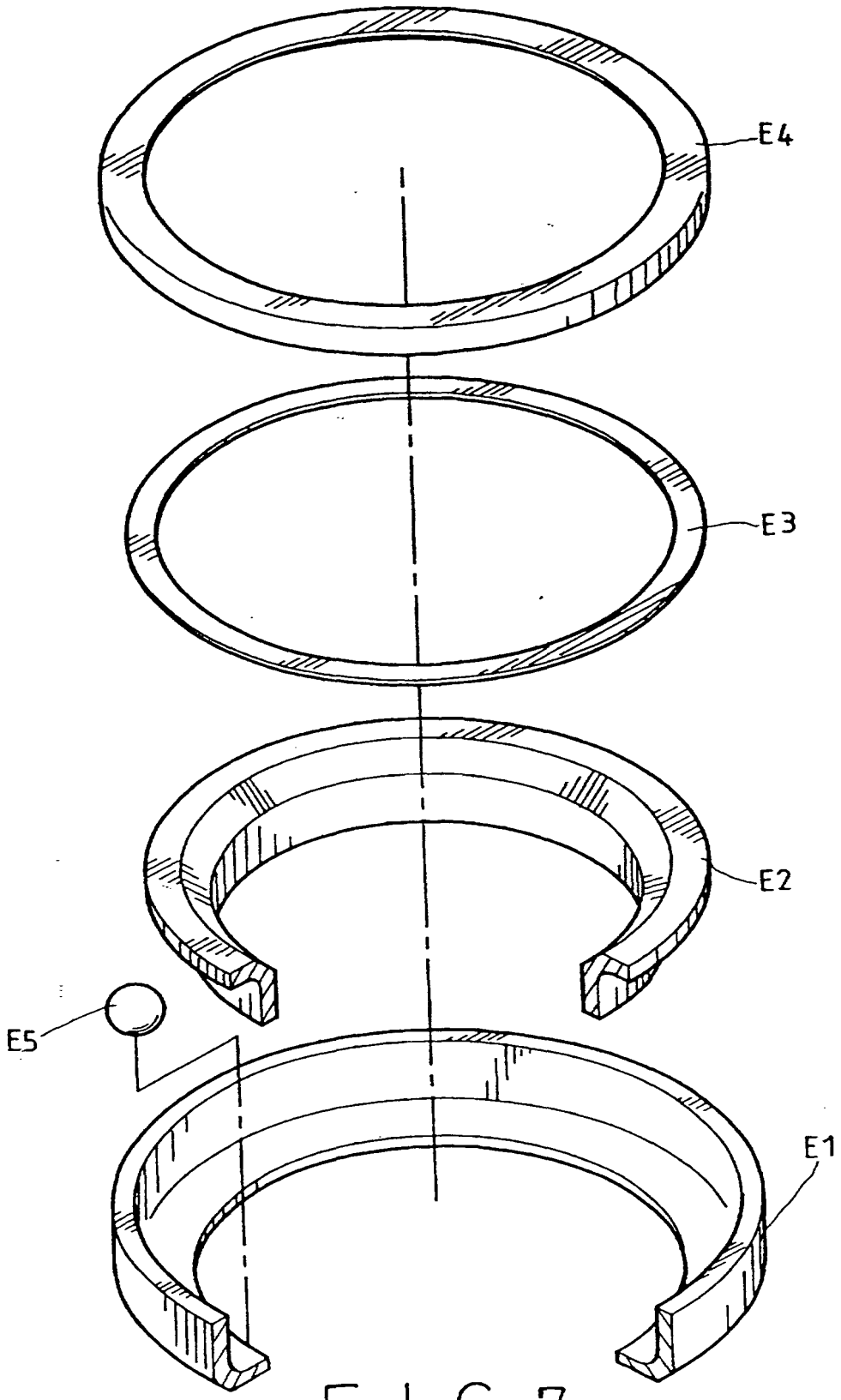

FIG.7
(PRIOR ART)

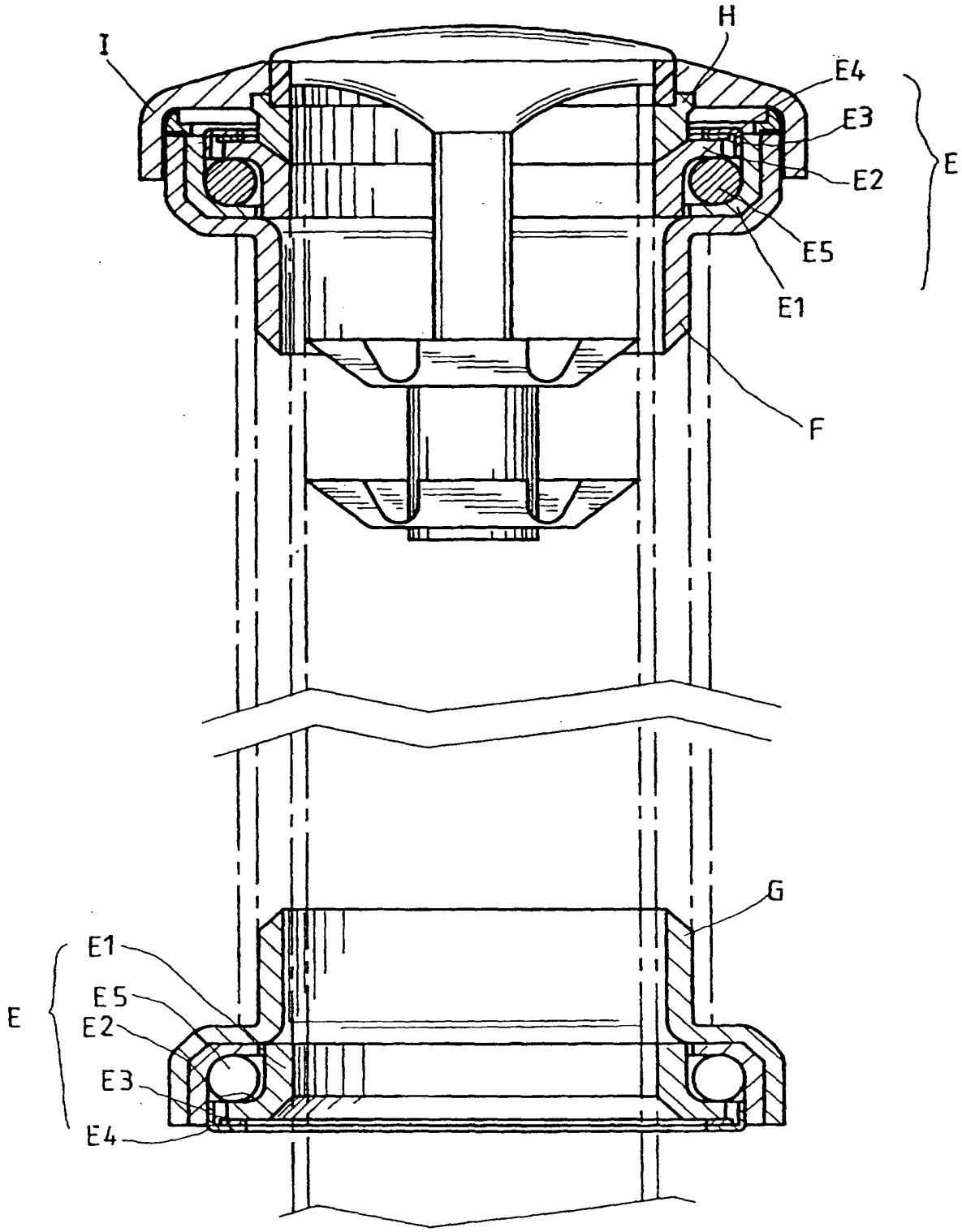

FIG. 8
(PRIOR ART)

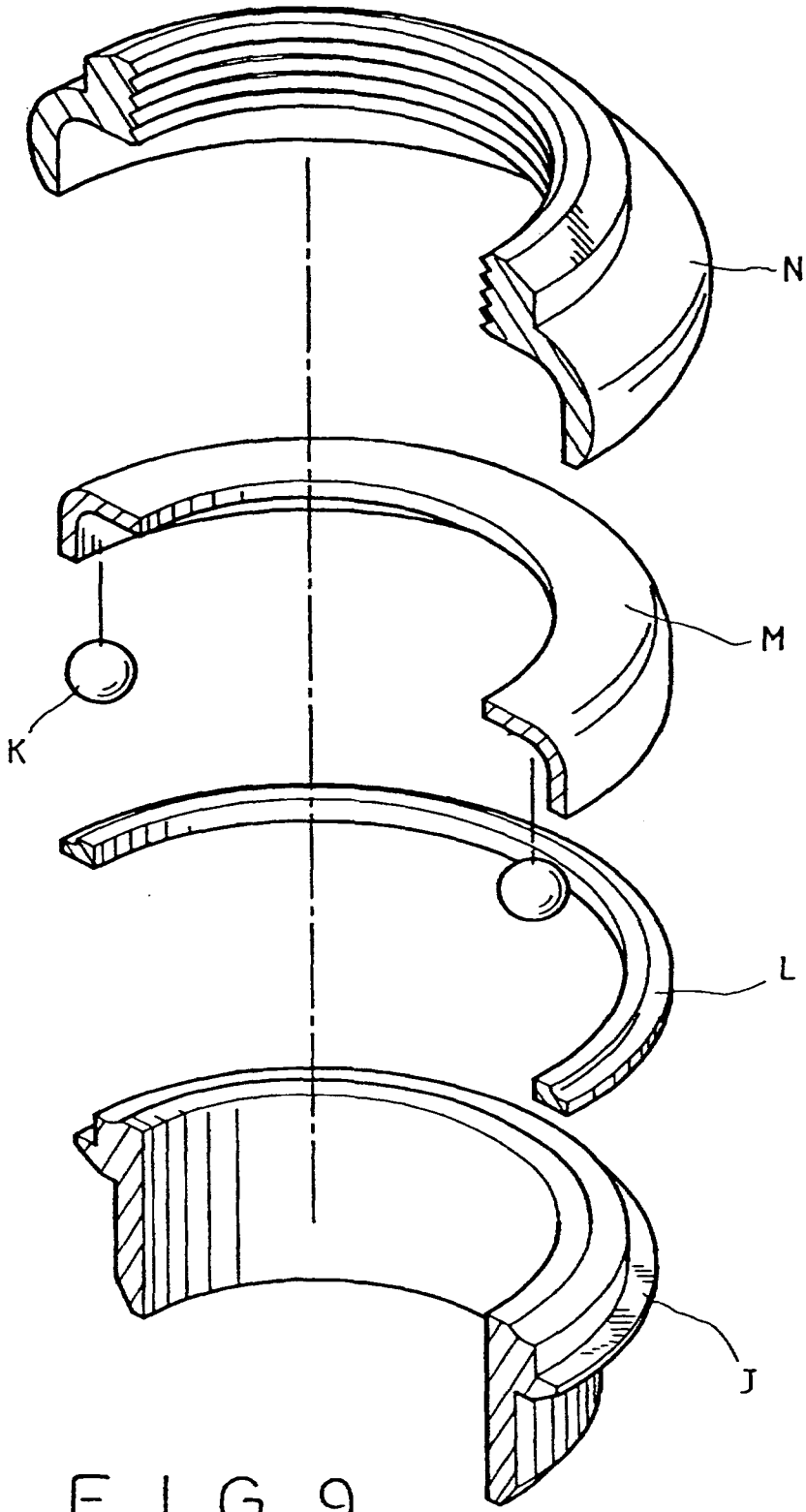

FIG. 9
(PRIOR ART)

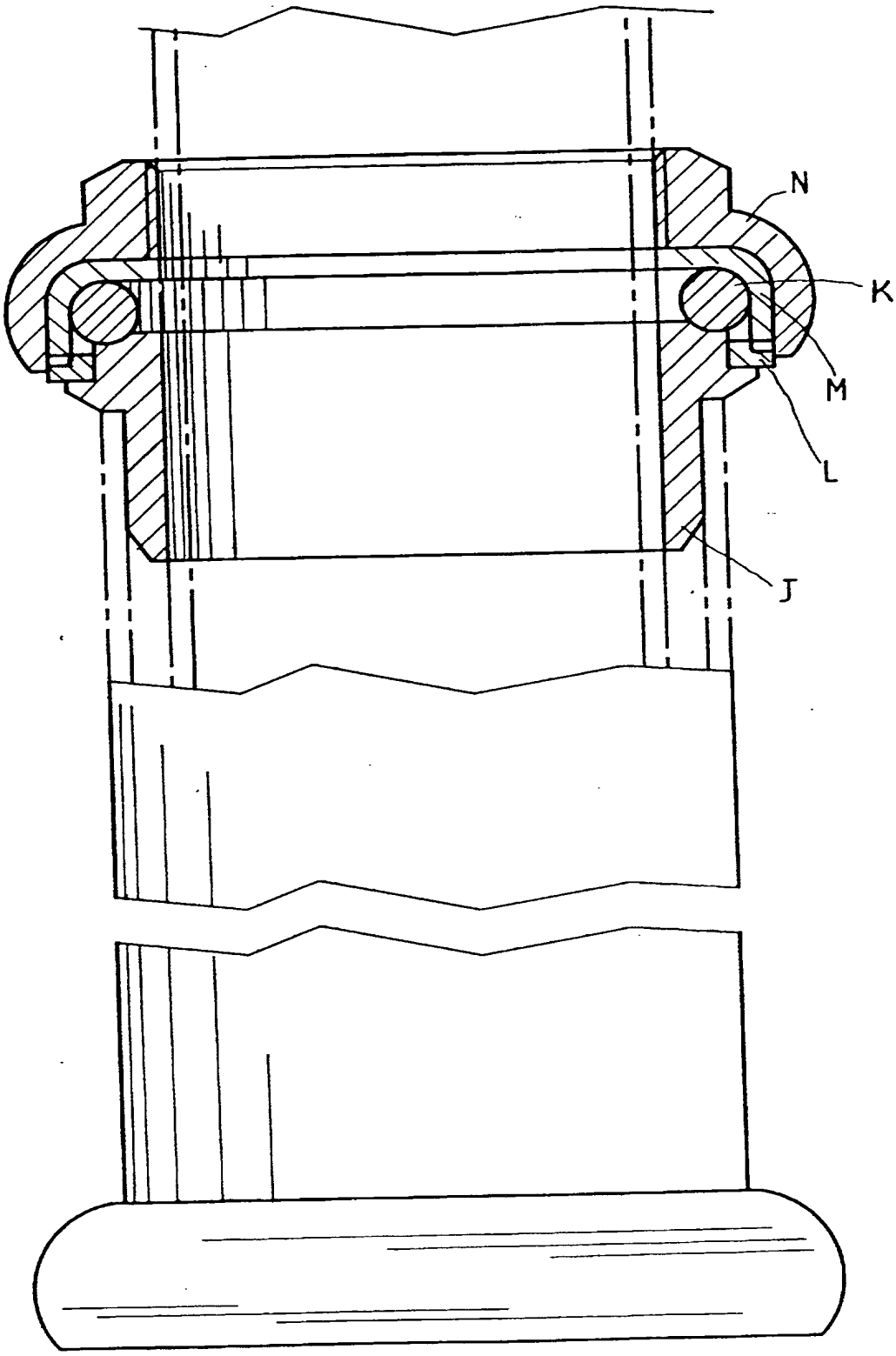

FIG. 10
(PRIOR ART)

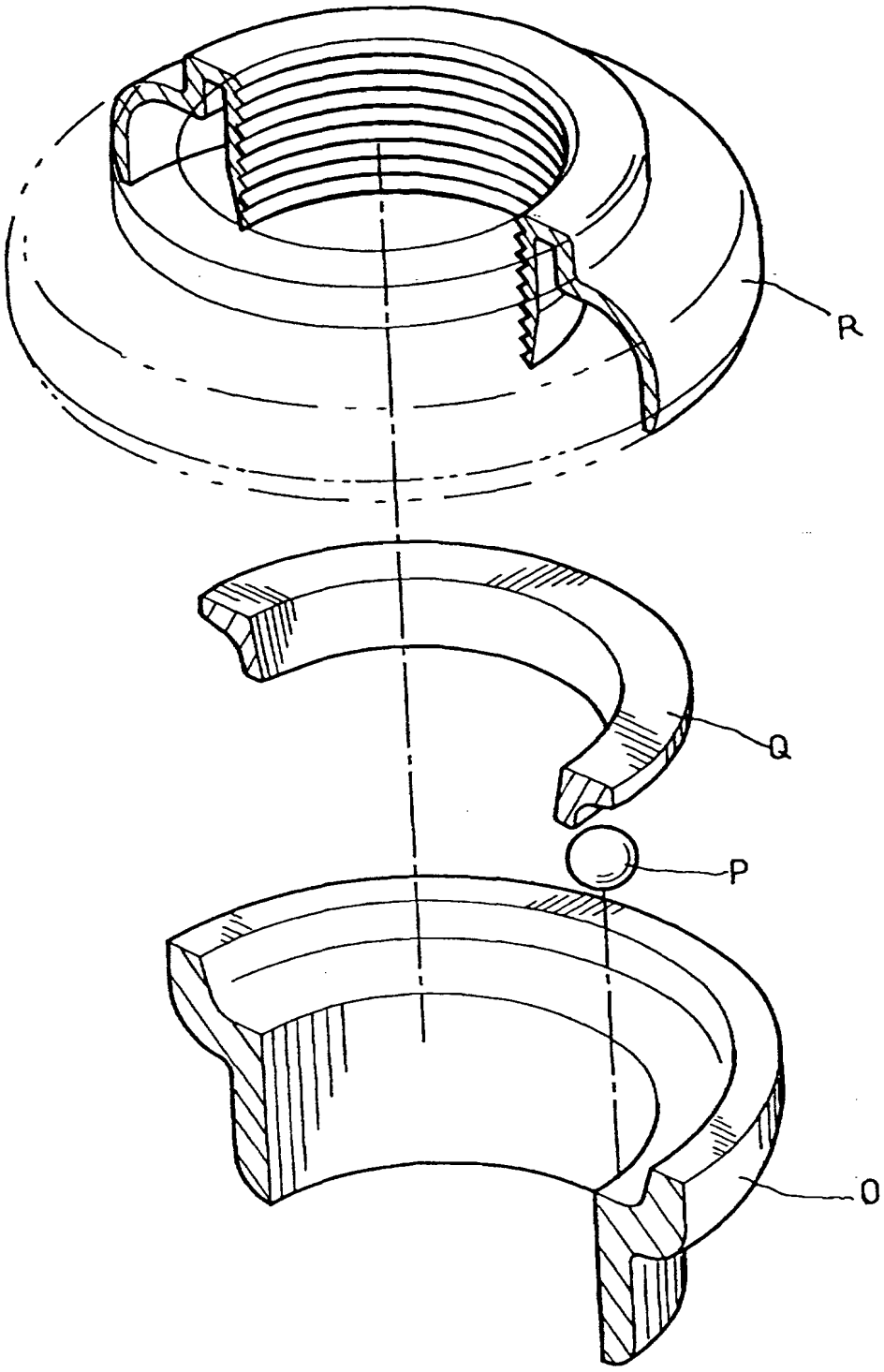

FIG.11
(PRIOR ART)

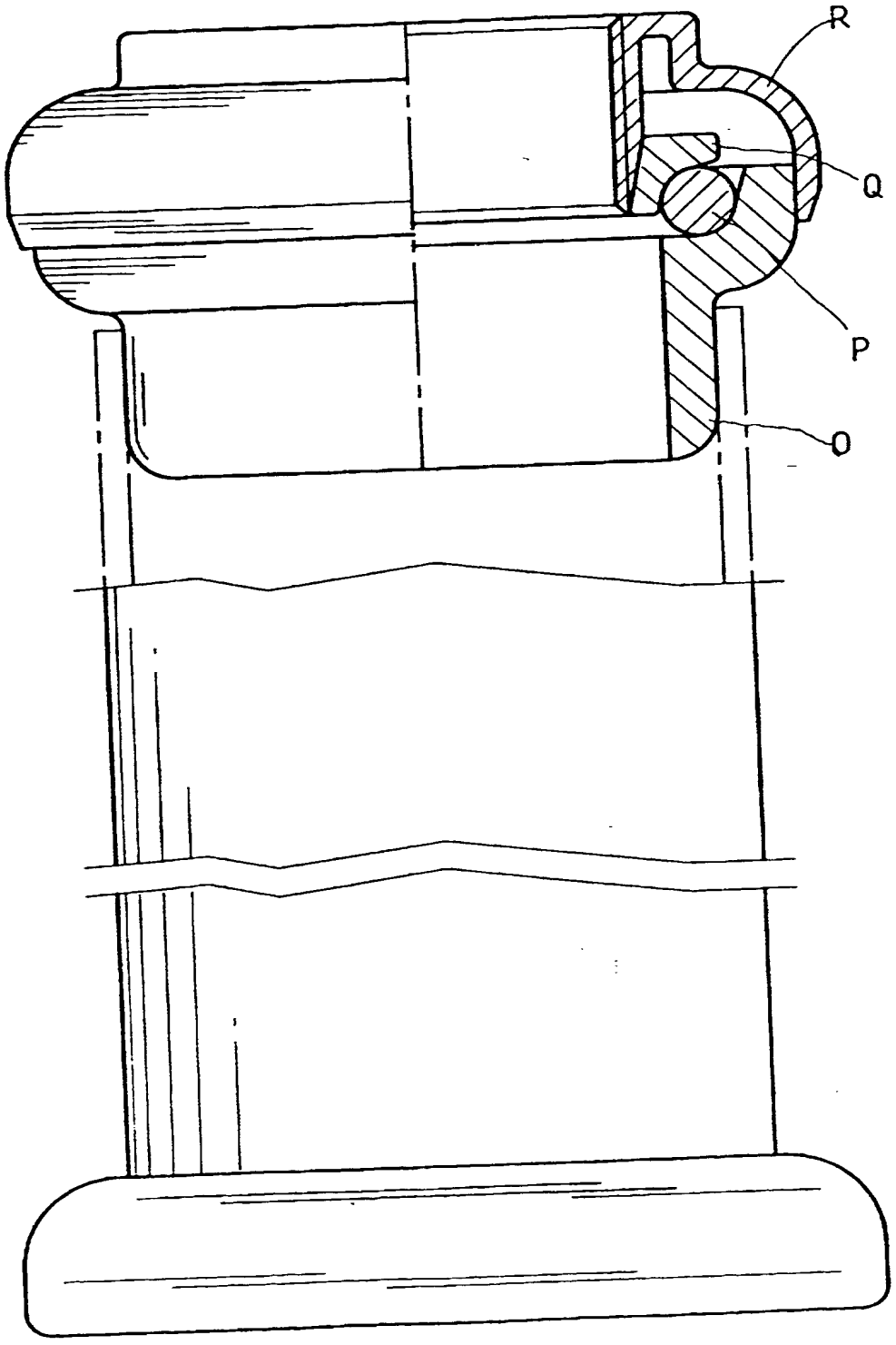

FIG. 12
(PRIOR ART)

TITLE: A STEERING HEAD SET OF BICYCLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a steering head set of bicycle, and more particularly to a steering head set in which all parts or assemblies are combined on the steering tube in butt and collar joint simply and easily.

2. Description of Prior Art

In accordance with the conventional steering head set of bicycle, as shown in Fig. 4, on the vertical steering tube connecting the top and the down tubes of the frame, the handlebar stem and the front fork are mounted from both sides in pin joint with an upper and a lower bearing cup sets so that they can swivel freely. The steering tube structure includes an upper and a lower bearing cup sets A and B, in which the upper bearing cup set A is mounted on the top end of the steering tube in the order of an upper cup A1, a ball nest A2 and an adjusting cone ring A3 from bottom to top successively.

Opposite the upper bearing cup set A, the lower bearing cup set B is mounted on the bottom end of the steering tube C in the order of an lower cup B1, a ball nest B2 and a setting cone ring B3 from top to bottom successively. Referring to Fig. 5, the shaft tube D1 of the front fork is slid into the steering tube C from the bottom side with the head extending outward from the top end of the steering tube C. The adjusting cone ring A3 screws on the male thread on the trunk of the shaft tube D1 to fix all parts in positions without any axial gap, just like the upper and the lower ball nests are located in place, so that the front fork can pivot freely on the shaft tube D1 in the steering tube relatively.

Analysing the above-mentioned structure, we can find that all the procedures of mounting the parts must be done in the production line, and will demand at least five workers and much time as with daubing grease in the ball tracks, if careless, the grease will contaminate the exterior portion of the frame. On the other hand, in practising, the pasty grease is liquidated into a fluid oil under external high temperature or friction-heat as swivelling of the steering handle frequently so that the fluid oil of the grease spills all over the upper and the lower cups A1 and B1 that contaminates the frame of the bicycle and causes less lubricating by leaking grease to increase the ware of the relative parts.

In accordance with the above-mentioned shortcomings, an easy-mounting steering head structure was derived, in which a bearing collar takes the place of above-mentioned ball nest in order to be assembled off-line in other place to simplify the mounting processes on-line, as shown in Fig. 6 and Fig. 8. The head cup-sets consist of two bearing collars E, upper and lower cups F and G, a sleeve H and a cap assembly I, wherein the bearing collar E, as shown in Fig. 7, includes a bearing shell E1, a cone race E2, a washer E3, a retaining ring E4 and several balls E5, by means of the balls, the cone race E2 can pivot on the bearing shell E1. In combining, co-operating with the upper and the lower cups F and G, this bearing collar E structure can simplify the mounting process obviously, but the above-mentioned shortcoming of running grease off is maintained in this case without any change, due to the unsealed gaps between the bearing shell E1 and the cone race E2.

In addition, as shown in Fig.9 and Fig. 10, another style conventional steering cup set consists of a bullet sleeve J, a plural balls K, a sealing ring L, a ball track M and a cap N, wherein the bullet sleeve J is plugged into the steering tube in tight fit, on-which the sealing ring L, the ball track M with balls K at inside portion, and co-operating with the cap N are fixed respectively and successively. As the first prior art mentioned above, all shortcomings of the first prior art are maintained in this structure. Referring to Fig. 11 and Fig. 12, the fourth prior art relates to a steering cup set mounting on the steering tube with divided components too. Taking the upper cup set as an example, as shown in Fig. 11, which includes a cup O, a plural balls P, a ball track Q and a cap R. In combining, first the cup O is seated on the steering tube, then the balls P and the ball track Q are located by the cap R on the cup O respectively and successively so that the cap R holds the inside of the ball track Q and the outside of the cup O on respectively. In this case, all the divided parts should be mounted on the steering tube on the production line, so it will demand more workers and time as above-mentioned.

All above-mentioned prior arts, whatever the divided components as the first, third and fourth, or pre-combined assemblies as the second can not seal the grease in and keep lubrication for a desired time.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore a main object of the present invention to provide a steering cup set in which a pre-combined bearing cup can be plugged into the steering tube directly to hold on the shaft tube of the front fork and make the front fork swivel in the steering tube freely.

This object is achieved by a steering cup set, which includes two bearing cups, a cap and a plugging adapter ring, wherein the bearing cup kit is to locate the balls or the ball nest in the space enclosed by the inside race of a bearing collar and the outside race of a cone ring, which has a cone surface at inside, a retaining ring set on the inside wall nearing the rim of the open of the bearing cup to retain the cone ring in the inside, and the bearing collar extends a proper length tube from the smaller end for plugging into the steering tube in tight fit. The cap has an outer collar flange and an inner collar flange with several axial notches and a taper surface corresponding to the inner cone surface of the cone ring; and the plugging adapter ring has a taper surface corresponding to the inner cone surface of the cone ring, and several axial notches. In combining, the bearing cups are located into the steering tube of the frame from both sides separately by plugging the tube portions of the bearing collars, co-operating to the cap and the plugging adapter ring, by the taper surfaces of them contacting with the cone surfaces of the cone rings respectively, to hold the shaft tube of the front fork on.

It is another object of the present invention to provide a steering cup set that can maintain a certain grease by a rim flange at inside of the bearing collar.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded view of the present invention;

Fig. 2 is an exploded view showing the bearing cup of the present invention;

Fig. 3 is a cross-section view of the present invention;

Fig. 4 is an exploded view of the first prior art;

Fig. 5 is a cross-section view of the first prior art;

Fig. 6 is an exploded view of the second prior art;

Fig. 7 is an exploded view showing the bearing cup of the second prior art;

Fig. 8 is a cross-section view of the second prior art;

Fig. 9 is an exploded view showing the upper bearing cup of the third prior art;

Fig. 10 is a part section view of the third prior art;

Fig. 11 is an exploded view showing the upper bearing cup of the fourth prior art;

Fig. 12 is a part section view of the fourth prior art.

DETAILED DESCRIPTION OF PRIFERRED EMBODIMENTS

Referring to Fig. 1, the present invention includes an upper and a lower cup kits 1 and 2, in which the upper cup kit comprises a bearing cup 11 and a cap 12, and the lower cup kit 2 comprises a bearing cup 21 and a plugging adapter ring 22.

The bearing cup 11 or 21, as referring to Fig.2, is to set several balls or a ball nest 112 or 212 into an inner cup face 1111 or 2111 of a bearing collar 111 or 211 along the inside ball track with the outside race 1131 or 2131 of a cone ring 113 or 213, which has an inner cone surface 1132 or 2132.

In combining, a retainer ring 114 or 214 jams into the inner cup face 1111 or 2111 of the bearing collar 111 or 211 nearing the rim of open end to retain the cone ring 111 or 211 inwardly, by a rim 1141 or 2141 of the retainer ring 114 or 214 jamming on a ring dent 1112 or 2112 of the bearing collar 111 or 211 to keep the lock secured between them; the bearing collar 111 or 211 extends a length tube 1113 or 2113 from the bottom of the cup face 1111 or 2111 to the opposite side forming a rim flange 1114 or 2114 at the inside bottom portion for maintaining some grease smearing on the balls 112 or 212 and the cup face 1111 or 2111 into maintain the lubrication of the bearing cup 11 or 21, further to make them run smoothly. Therefore the bearing up 11 or 21 can be pre-assembled as an individual assembly be used independently without combining them on the production line. The cap 12 has an inner and an outer collars 121 or 122 corresponding to the cone ring 113 of the bearing cup 11 in the upper cup kit 1, in which the inner collar 121 forms an outer taper face 1211 for retaining on the inner cone face 1132 of the cone ring 113, and several axial open slots 1212 along the edge of the open end, the outer collar 122 is used for covering the outside of the bearing collar 111. The plugging adapter ring 22 has a taper face 221 formed on the outer head for retaining on the inner cone face 2132 of the cone ring 213 of the bearing cup 21 in the lower cup kit 2, and several axial open slots 222 along the edge of the open.

In combining, referring to Fig. 3, two bearing cups 11 and 12 are plugged into the steering tube 3 from both ends with the tubes 1113 and 2113 in tight fit, then put the plugging adapter ring 22 and the combined steering tube 3 on the shaft tube 4 of the front fork respectively so that the taper face 221 touches against the inner cone face 2132 of the cone ring 213 of the bearing cup 21, finally screw the cap 12 on the shaft tube 4 of the front fork downward into the steering tube 3 so that the taper face 1211 of the inner collar 121 presses against the cone face 1132 of the cone ring 113, meanwhile the open slots

1212 on the inner collar 121 of the cap 12 and 222 on the plugging adapter ring 22 clamp on the shaft tube 4 of the front fork tightly. The installation is so simple that time and man-hour can be saved tremendously. Due to some sealing structures, the grease is maintained in the inside of the cup kits without any contamination.

I CLAIM:

1. A steering head set of bicycle comprising an upper and a lower cup kits, which includes two bearing cups, a cap and a plugging adapter ring at least; and the improvements comprising:

balls being placed into an inner cup face of a bearing collar along an inner ball track with an outside race of a cone ring, in combining, a retainer ring been jammed into said inner cup face of said bearing collar nearing the rim of open end to locate above-mentioned parts into said bearing collar as an integrated component; said cap having an inner and an outer collars corresponding to said cone ring of said bearing cup in said upper cup kit, in which said inner collar forming an outer taper face for retaining on said inner cone face of said cone ring, and several axial open slots along the edge of said open end; said plugging adapter ring having a taper face formed on said outer head for retaining on said inner cone face of said cone ring of said bearing cup in said lower cup kit, and several axial open slots along the edge of said open; in combining, said two bearing cups being fixed on said steering tube from both ends respectively, co-operating with said cap and said plugging adapter ring pressing down from both ends separately, said shaft tube of said front fork being held on excepting swivelling.

2. The steering head set of bicycle comprising an upper and a lower cup kits, which includes two bearing cups, a cap and a plugging adapter ring at least; wherein the bearing collar forms a rim flange at the bottom along the inner circle edge on the inside cup face for providing a space containing the balls.

3. The steering head set of bicycle as claimed in claim 2, wherein said rim flange structure can be applied to any style of cup kit structure to provide a space for containing the balls or ball nest.

Amendment to the claims have been filed as follows

1. A steering head set for a bicycle comprising a head tube, an upper cup assembly comprising a bearing cup and a cap and a lower bearing cup assembly comprising a bearing cup and a cap and a lower bearing cup assembly comprising a bearing cup and an adapter ring, each bearing cup comprising a bearing collar having an inner tubular portion surrounded by a face, a bearing ring engaged in the collar and defining with said faces a circular ball race, bearing balls received in the race and retaining means engaged with the collar for retaining the bearing ring in position, the cap being engaged over the collar of the upper assembly and the adapter ring being engaged as a plug within the collar of the lower assembly, the inner tubular portion of each collar of each assembly being plug-fittable in a respective end of the head tube.

2. A steering head set according to Claim 1 wherein the cap has an inner circular wall received in the collar of the upper assembly and having a tapered face, which engages a complementary tapered face of the bearing ring of the upper assembly.

3. A steering head set according to Claim 2 including axial slots through and around the inner circular wall.

4. A steering head set according to Claim 1, 2 or 3, wherein the adapter ring has a tapered face which engages a complementary tapered face of the bearing ring of the lower assembly.

5. A steering head set according to Claim 4, including axial slots through and around the adapter ring.

6. A steering head set, substantially as herein described with reference to Figs 1 to 3 of the accompanying drawings.

7. A method of assembling the parts of the steering head set of Claim 1 comprising plug-fitting the pre-assembled upper assembly in one end of the head tube and plug-fitting the pre-assembled lower assembly in the opposite end of the head tube.

The Patent Office

Application No:	GB 9718687.8	**Examiner:**	Robert Crowshaw
Claims searched:	1 to 3	**Date of search:**	27 November 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B7E (ESJ)

Int Cl (Ed.6): B62K 19/32, 21/06

Other: Online database: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2111002 A	(SKF) See the upper bearing cup 8, cap 9, lower bearing cup 6 and ring 5 in figure 1, and note the rim flange on bearing cups 6,8 for containing balls 4,7.	2
X	GB 0852828	(CAMPAGNOLO) See the upper bearing cup 8, cap 10, lower bearing cup 8 and ring 9 in figure 1, and note the rim flange on bearing cups 8,19 for containing balls.	2
X	EP 0093379 A2	(MORI) See the upper bearing cup 24, cap 23, lower bearing cup 25 and ring 22 in figure 2, and note the rim flanges 24A,25A for containing balls 27,28.	2
X	US 5246297	(YI-CHEN CHI) Note the upper and lower bearing units 18,16 in figure 1.	2
X	US 5246296	(YI-CHEN CHI) See the upper bearing cup 21 and cap 23, lower bearing cup and ring in the figures, and note the rim flanges on the cups for containing balls.	2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

The Patent Office

Application No: GB 9718687.8 **Examiner:** Robert Crowshaw
Claims searched: 1 to 3 **Date of search:** 27 November 1997

Category	Identity of document and relevant passage		Relevant to claims
X	US 4445703	(MARUI) See the upper bearing cup and cap, lower bearing cup 8 and ring 1 in the figures, and note the rim flanges on the cups for containing balls 14.	2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.